The Electrochemical and Corrosion Behavior of Biocompatible Magnesium Alloy in simulated body fluid

Jiayang Liu
Department of Mechanical Engineering, Indiana University Purdue University Indianapolis, Indianapolis, Indiana, United Stated of America

*e-mail: liu339@iupui.edu

Magnesium alloys are newly promising biomaterials for human bone replacement or repair. However, magnesium alloy need more resistant to corrosion when it is implant in human body. In this investigation, protective microarc oxidation (MAO) coatings were generated on AZ31 Mg alloys in sodium phosphate electrolyte. The coating were produced under various applied voltage. The corrosion behavior of MAO was analyzed in this study. Optimization of the MAO controlling parameters would provide a higher corrosion resistance on AZ31 magnesium alloy. A seven-day-immersion test was applied on both uncoated Mg alloy and MAO-coated Mg alloy. To evaluate the corrosion properties, the potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) experiments were used in this research. The degrading rate of the MAO-coated AZ31 alloy is reduced because MAO coating and the corroding product layer protected the substrate and declined the reflecting rate. The corrosion process and mechanism of MAO-coated AZ31 alloys in SBF were modeled according to the electrochemical corrosion results and surface analysis. Under optimized controlling parameters, it is to be sure that the MAO-coated AZ31Mg alloy is superior on material which are implanted in human body for biomedical applications.